To Whom It May Concern

## I. INTRODUCTION

1. I, Lee E. Morrow, M.D., submit this expert report on behalf of the heirs of Shane Aumick.

2. I have been asked to provide a statement of my opinions, based on my experience, education, training, knowledge of the literature, and materials reviewed, regarding the cause of death for Shane Aumick.

## II. QUALITIFICATIONS AND EXPERIENCE

3. I am currently a Professor of Medicine at the Creighton University School of Medicine, a Professor of Pharmacy Practice at the Creighton University School of Pharmacy and Allied Health Professions, and a Professor of Clinical Research at the Creighton University School of Medicine in Omaha, Nebraska. I am also the Chief Medical Officer (CMO) for Live On Nebraska in Omaha, Nebraska.

4. My academic office is currently located at the Creighton University Medical Center, Bergan-Mercy Hospital (7710 Mercy Road, Suite 401, Omaha, Nebraska, 68124).

5. I earned my M.D. degree from the University of Iowa College of Medicine in Iowa City, Iowa, in 1996. I completed my residency in Internal Medicine at Memorial Health University in Savannah, Georgia, in 1999. I completed fellowships in Pulmonary Medicine and Critical Care Medicine at Washington University in St. Louis, Missouri, in 2002.

6. I have maintained continuous certifications by the American Board of Internal Medicine in General Internal Medicine since 1999, in Pulmonary Diseases since 2002, and in Critical Care Medicine since 2003.

**Exhibit E**

7. Additional details regarding my training, clinical experience, research, and publications can be reviewed in my curriculum vitae, Attachment A.

8. All other cases in which, during the previous four years, I have testified as an expert at trial or by deposition are outlined in Attachment B.

9. I receive $425 per hour for consultations and testimony rendered during the course of the case. My compensation does not depend on the opinions rendered nor the outcome of this case.

## III. MATERIALS CONSIDERED

10. To date I have reviewed the documents outlined in Attachment C.

## IV. GENERAL OPINIONS

11. In my opinion, and to a reasonable degree of medical certainty, Shane Aumick died of a cardiac arrest caused by positional asphyxia.

12. The etiology of Shane Aumick's positional asphyxia was multifactorial with contributions from:

a. Binding of Shane Aumick's wrists behind his back using handcuffs

b. Prone positioning of Shane Aumick

c. Subsequent raising of Shane Aumick's arms for pain compliance

d. Kneeling and/or other attempts at side control which would put pressure on Shane Aumick's thorax (the chest, back, and/or sides of the ribcage)

e. Shane Aumick's obesity (BMI=32.9 based on the Medical Examiner's height of 67 inches and weight of 210 pounds)

13. In my opinion, and to a reasonable degree of medical certainty, acute methamphetamine intoxication potentiated the effects of Shane Aumick's positional asphyxia.

14. In my opinion, and to a reasonable degree of medical certainty, acute blood loss anemia potentiated the effects of Shane Aumick's positional asphyxia.

## V. RATIONALE FOR OPINIONS

Basic Physiology

15. Human physiology requires a continuous supply of oxygen (abbreviated $O_2$) to the body. When the oxygen supply is less than the body needs, a condition known as hypoxia, organs become injured. With substantial hypoxia, organs are unable to properly function. If the heart becomes sufficiently hypoxic, cardiac arrest occurs. [Rosen 2021]

16. Human physiology also requires maintaining the acid level of the blood (the pH) within a narrow range (7.35-7.45). When the pH level is below normal (<7.35), a condition known as acidosis, organs in the body are unable to properly function. Acidosis can result from metabolic or respiratory causes as outlined below. Critical acidosis often precipitates cardiac arrest. [Morrow 2018, Feller-Kopman 2021]

17. The lungs are a key organ in maintaining the $O_2$ level and in maintaining the pH of the blood. During breathing, also called respiration or ventilation, breathing in (also known as inspiration) brings a supply of $O_2$ into the lungs while breathing out (also known as exhalation) releases the volatile acid carbon dioxide (abbreviated $CO_2$) into the environment. [Arthurs 2005, Morrow 2018, Feller-Kopman 2021, Rosen 2021]

18. The lungs cannot do their job in isolation: they require adequate blood and a functioning pump. The blood is necessary to carry the $O_2$ from the lungs' air sacs (also known as the alveoli) to the various organs where the $O_2$ can be used. The lungs similarly require blood to carry the $CO_2$ from the organs to the air sacs where it can be released and exhaled. The heart

is the pump that circulates the $O_2$ rich blood from the lungs out to the organs and then brings the $CO_2$ rich blood from the organs back to the lungs. [Arthurs 2005, Dunn 2016, Rosen 2021]

Oxygen Delivery

19. Hemoglobin (abbreviated Hgb) is the molecule in the red blood cells of the blood that bind and carry most of the $O_2$ and $CO_2$. Smaller amounts of $O_2$ and $CO_2$ are dissolved in the liquid portion of the blood (also known as the plasma). [Arthurs 2005, Feller-Kopman 2021, Rosen 2021] Thus, the amount of $O_2$ delivery to and/or $CO_2$ removal from the tissues is heavily dependent on the amount of hemoglobin in the body.

20. The amount of $O_2$ delivered from the lungs to the tissues (abbreviated $DO_2$) can be calculated by multiplying the amount of blood reaching the tissues per minute (the cardiac output, abbreviated CO) times the amount of $O_2$ contained in the blood (also known as the arterial oxygen content, abbreviated $CaO_2$). [Dunn 2016, Rosen 2021]

21. The cardiac output equals the volume of blood pumped with each heartbeat (also known as the stroke volume, abbreviated SV) multiplied by the number of times the heart beats each minute (also known as the heart rate, abbreviated HR). [Dunn 2016, Rosen 2021]

22. The oxygen content of the blood equals the amount of $O_2$ bound to hemoglobin plus the amount of $O_2$ dissolved in the plasma. [Dunn 2016, Rosen 2021]

a. Each gram of hemoglobin can carry 1.34 mL of $O_2$ if every hemoglobin molecule is bound to $O_2$. Thus, the $O_2$ bound to hemoglobin equals 1.34 mL of $O_2$ per gram of hemoglobin times the measured grams of hemoglobin per deciliter times the percent saturation (abbreviated $SaO_2$) of the hemoglobin. [Dunn 2016, Rosen 2021]

b. The amount of $O_2$ dissolved in the blood is determined by the partial pressure of $O_2$ (abbreviated $PaO_2$). Each mm Hg of pressure causes 0.0031 mL of $O_2$ to dissolve in the blood. Thus, the dissolved $O_2$ in the blood equals the partial pressure of $O_2$ times 0.0031. [Dunn 2016, Rosen 2021]

c. This is commonly written out using the formula:

$CaO_2 = (1.34 \times Hgb \times SaO_2) + (0.0031 \times PaO_2)$ [Dunn 2016, Rosen 2021]

23. Thus, the formula for the amount of $O_2$ delivered from the lungs to the tissues is as follows: $DO_2 = (SV \times HR) \times (1.34 \times Hgb \times SaO_2) + (0.0031 \times PaO_2)$. Reductions in any of the variables in this formula will result in a decrease in the amount of $O_2$ delivered to the tissues if there is not a compensating increase in one of the other variables in the formula. [Dunn 2016, Rosen 2021]

24. Severely impaired $O_2$ delivery results in several potentially life-threatening clinical manifestations including confusion, irregular heart rhythms, and metabolic acidosis from excess lactic acid production. [Morrow 2018]

Carbon Dioxide Removal

25. Minute ventilation (abbreviated MV) is the amount of air that enters and exits the lungs each minute. Minute ventilation is calculated by multiplying the number of breaths per minute (also known as the respiratory rate, abbreviated RR) times the amount of air in each breath (also known as the tidal volume, abbreviated VT). [Morrow 2018, Feller-Kopman 2021]

26. The level of $CO_2$ in the blood is inversely proportional to the minute ventilation. When the minute ventilation increases, the $CO_2$ decreases, and the blood becomes more alkalotic. When the minute ventilation decreases, the $CO_2$ increases, and the blood becomes more acidic. Excess $CO_2$ in the blood resulting in acidosis is called respiratory acidosis to

distinguish it from the metabolic acidosis previously described [Morrow 2018, Feller-Kopman 2021]

27. The level of $CO_2$ in the blood is constantly monitored by the brain's respiratory center. If the $CO_2$ in the blood rises too high, the respiratory center increases minute ventilation by increasing the respiratory rate and/or tidal volume. If the $CO_2$ in the blood falls too low, the respiratory center decreases minute ventilation by decreasing the respiratory rate and/or tidal volume. [Morrow 2018, Feller-Kopman 2021]

28. The tidal volume – the 'size' of each breath – is primarily determined by the ability of the diaphragms and the muscles between the ribs to contract in synchrony. When the diaphragms contract the lungs are stretched from top to bottom: when the muscles between the ribs contract the lungs are stretched from front to back and from side to side. This stretching of the lungs in all three dimensions effectively pulls $O_2$ rich air into the lungs. [Steinberg 2021]

29. When the lungs are fully expanded at the end of each inspiration, the elastic fibers within the lung tissue are fully stretched. As the diaphragms and the muscles between the ribs relax, the elastic fibers cause the lungs to recoil back to their resting position resulting in exhalation. Essentially, the elastic fibers squeeze the air out of the lungs during exhalation, thereby releasing $CO_2$ into the environment.

30. Maintaining a normal acid level (pH) in the body requires the ability to adjust the amount of $CO_2$ released into the environment to match the amount of acids (including $CO_2$) being produced. If a person's acid level increases, their minute ventilation must similarly increase – through an increase in respiratory rate, tidal volume, or both – to 'blow off' $CO_2$ until the blood pH is normal. [Morrow 2018]

31. Severe acidosis results in several potentially life-threatening clinical manifestations including confusion, electrolyte shifts, and irregular heart rhythms. [Morrow 2018, Steinberg 2021]

Positional Asphyxia

32. The term asphyxia describes reduced oxygen and/or excess carbon dioxide in the body caused by inadequate gas (oxygen and carbon dioxide) exchange. Positional asphyxia is a form of asphyxia wherein inadequate gas exchange is caused by the positioning of the body. Restraint asphyxia is a form of positional asphyxia wherein the positioning of the body causing inadequate gas exchange is specifically the application of restraints – either mechanical or 'hands on' techniques. [Paterson 1998, Steinberg 2021]

33. Positional asphyxia can occur when a person is forced to assume a position that impairs their ability to ventilate. The resulting low $O_2$ level (hypoxia leading to metabolic acidosis) and/or accumulation of $CO_2$ (respiratory acidosis), if not promptly recognized and remediated by repositioning, is a fatal situation. [Steinberg 2021]

34. With Officer Kaleb Berkshire controlling Shane Aumick's pronated upper body and EMT Stephen Wood controlling Shane Aumick's lower body, Shane Aumick was in the prone-ground restraint position, a variant of the hobble restraint position. [Paterson 1998]

35. Binding of Shane Aumick's wrists behind his back using handcuffs stretched the ribcage muscles and impaired their normal function during respiration. Any subsequent raising of Shane Aumick's arms for pain compliance would further stretch the ribcage muscles and magnify the adverse effects on respiration. [Aumick Police Report, Berkshire Deposition, Wood Deposition, Roeggla 1997, Steinberg 2021]

36. Prone positioning (lying face down) forced Shane Aumick's weight onto the anterior (front) portion of his ribcage, impeding his ability to expand the ribcage and substantially reducing his ability to ventilate (inhale $O_2$ and exhale $CO_2$). [Aumick Police Report, Body Camera Video, Brodsky 2001, Steinberg 2021]

37. Prone positioning also acted as an abdominal binder, forcing the fat and organs in Shane Aumick's protuberant abdomen to press up against his diaphragms. [Aumick Police Report, Body Camera Video, Brodsky 2001] This further impaired Shane Aumick's ventilation and led to further low $O_2$ and high $CO_2$ levels. [Paterson 1998, Steinberg 2021]

38. The prone-ground restraint position, the position Shane Aumick was placed in by Officer Kaleb Berkshire, has been shown to reduce pulmonary function by up to 40%. [Roeggla 1997, Steinberg 2021]

39. The kneeling and/or side control maneuvers Officer Kaleb Berkshire utilized applied additional pressure to Shane Aumick's thorax (back, sides of his ribcage, and/or sides of his abdomen) and further impaired his ability to ventilate. [Aumick Police Report, Berkshire Deposition, Wood Deposition, Paterson 1998, O'Halloran 2000]

40. The prone-ground restraint position Shane Aumick was in also reduces cardiac output by up to 40%. [Roeggla 1997, Steinberg 2021] Shane Aumick's reduced cardiac output further decreased $O_2$ delivery to his tissues (worsened hypoxia) and reduced $CO_2$ return to the lungs (worsened acidosis).

41. These adverse cardiac and pulmonary effects are evident after three minutes of prone-ground restraint. [Roeggla 1997] Based on Officer Kaleb Berkshire's body camera footage and Shane Wood's deposition testimony, Shane Aumick was kept in the prone-ground restraint

position for eight minutes and thirteen seconds (from 06:21:48 to 06:30:01). [Body Camera Video, Wood Deposition]

42. Forceful struggle against restraints increased Shane Aumick's $O_2$ consumption (which would lower the amount of $O_2$ in the blood) while simultaneously increasing $CO_2$ production (which would make the blood more acidic). [Body Camera Video, Berkshire Deposition, Wood Deposition, Hick 1999, O'Halloran 2000, Steinberg 2021]

Effects Of Methamphetamine

43. Methamphetamine is an amphetamine family drug that is commonly abused for its euphoric, hallucinogenic, and stimulant effects. [Boyer 2021]

44. Methamphetamine is a stimulator of the adrenaline receptors and causes increased heart rate, increased blood pressure, and increased metabolism: increased metabolism causes increased $O_2$ consumption, increased $CO_2$ production, and an increase in body temperature with sweating. [Boyer 2021]

45. Clinical manifestations of methamphetamine use are variable but include tachycardia (fast heart rate), acidosis (too much acid in the blood), agitated delirium (extremely altered thinking with aggression), vasospasm (narrowing of the blood vessels), and cardiovascular collapse (cardiac arrest/death). [Boyer 2021]

46. Many drugs, prescribed or illicit and including methamphetamine, have 'dose dependent effects' meaning that larger amounts of ingested drug lead to higher levels of drug in the blood and larger effects on the body. [Martin 1970]

47. As with any drug, prescribed or illicit and including methamphetamine, there is a level above which the drug becomes harmful (toxic). The toxic blood level of methamphetamine is 0.6-5.0 μ/mL while the lethal range is >10 μ/mL. [Winek 2001]

48. At the time of his death, Shane Aumick's blood level of methamphetamine was 484 ng/mL (which is equivalent to 0.484 µg/mL). [Aumick Toxicology Report] This level is consistent with methamphetamine intoxication (being 'high') but is below the threshold for toxicity and is less than 5% of the lethal range.

49. At the time of his death, Shane Aumick was intoxicated on methamphetamine. [Aumick Toxicology Report] To a reasonable degree of medical certainty, the effects of methamphetamine potentiated Shane Aumick's positional asphyxia. These effects included:

a. Increased $O_2$ consumption – which would necessitate an increase in $O_2$ delivery to prevent hypoxia, metabolic acidosis, and organ damage

b. Increased CO2 production – which would necessitate an increase in ventilation to prevent respiratory acidosis

c. Vasospasm, hypertension, and tachycardia – each of which would reduce the cardiac output and $O_2$ delivery

Effects Of Anemia

50. The police body camera videos and the photos taken at the scene both show substantial amounts of blood in various locations. [Body Camera Video, Scene Photos] The police report similarly describes a large amount of blood at the scene. [Aumick Police Report, Wood Deposition]

51. The Medical Examiner report documents multiple ¼ to ½ inch lacerations to Shane Aumick's body. [Medical Examiner report] Thus, one can deduce that some, if not all, of the blood at the scene belonged to Shane Aumick.

52. To a reasonable degree of medical certainty, Shane Aumick was suffering from an unknown degree of acute blood loss anemia (reduced hemoglobin levels) that potentiated his positional asphyxia by further decreasing $O_2$ delivery.

53. The standard of care for a healthcare worker with any degree of medical training, including an EMT, would be to assess an individual for wounds if they saw evidence of bleeding. Despite the substantial amount of blood at the scene, EMT Stephen Wood did not assess Shane Aumick for wounds other than a cursory assessment of his hands – an assessment that was done while restraining Shane Aumick's legs.

Excited Delirium

54. Delirium is the term used medically to describe confused thinking and reduced attention the environment. [Mattison 2020] Excited delirium is a nonspecific term used to describe patients who are agitated and aggressive resulting in acute distress and death. [Takeuchi 2011]

55. Excited delirium is not currently a recognized medical diagnosis. Medical diagnoses recognized by the World Health Organization each have an International Classification of Disease (ICD-10) code. There is no such ICD-10 code for excited delirium. [Takeuchi 2011] However, there are ICD-10 codes for positional asphyxia (T71.1, Asphyxiation due to mechanical threat to breathing), methamphetamine intoxication (F15.929, Other stimulant use, unspecified with intoxication), and anemia due to blood loss (D50.0).

56. Excited delirium is not currently a recognized psychiatric diagnosis. Psychiatric diagnoses recognized by the American Psychiatric Association each have diagnostic criteria delineated in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V). There are no such criteria for excited delirium. [Takeuchi 2011]

57. The American Medical Association (AMA), the largest physician professional society in the United States, has adopted a policy that specifically opposes excited delirium as a medical diagnosis. [AMA 2021]

58. To a reasonable degree of medical certainty, Shane Aumick was both agitated and delirious at the time of his death, but his cause of death was not "Agitated Delirium" as listed on the Medical Examiner's report as this is not an accepted medical or psychiatric diagnosis.

Other Observations

59. Shane Aumick had six of the seven biggest risk factors for death while restrained: agitated delirium, use of a hobble restraint, prone position, forceful struggle against restraint, stimulant drug use, and obesity. [Stratton 2001]

60. A known sign of impending cardiorespiratory arrest while restrained is cessation of struggle against restraints. [Stratton 2001] Shane Aumick's speech while supine progressed from loud and disordered but intelligible, to incoherent babbling with normal volume, to barely audible, to silent at 06:26:54. Similarly, Shane Aumick was initially combative while supine but became essentially still at 06:26:50. Thus, it is likely that Shane Aumick experienced a cardiac arrest shortly after 06:27:00.

61. After Shane Aumick became unresponsive, his condition was not properly recognized in a timely manner. At 06:28:02 Officer Kaleb Berkshire asked Shane Aumick "Are you going to be calm now?" Although Shane Aumick did not respond, neither Officer Kaleb Berkshire nor EMT Stephen Wood properly assessed Shane Aumick. At 06:29:49 EMT Stephen Wood asked Officer Kaleb Berkshire "Is he still conscious?" to which Officer Kaleb Berkshire responded "Yeah." However, at 06:30:01 Officer Kaleb Berkshire states "Well, I think he is." This exchange prompted an assessment that led to recognition of Shane Aumick's loss of

consciousness, lack of a pulse (06:32:14) and asystole or lack of a heartbeat (06:33:19). [Body Camera Video]

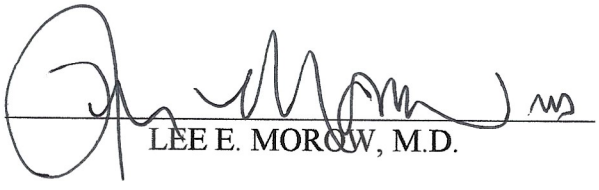
## IV. SUMMARY OPINION

62. In my opinion, and to a reasonable degree of medical certainty, Shane Aumick experienced positional asphyxia due to the actions of Officer Kaleb Berkshire and EMT Stephen Wood which resulted in Shane Aumick's cardiac arrest and death.

**New and Additional Information**

I reserve the right to supplement or amend my opinions and conclusions in response to opinions expressed by other experts, or in light of any additional evidence, testimony, discovery, and/or other information relating to the afore-mentioned issues that may be provided to me after the date of this report.

Signed this 11th day of January, 2022.



LEE E. MORROW, M.D.